# Interview Summary	Application No. 09/396,381	Applicant(s) Yamazaki et al.
	Examiner Martin J. Angebranndt	Group Art Unit 1756

All participants (applicant, applicant's representative, PTO personnel):

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Date of Interview *May 2, 2000*

Type: ☐ Telephonic ☒ Personal (copy is given to ☐ applicant ☒ applicant's representative).

Exhibit shown or demonstration conducted: ☐ Yes ☒ No. If yes, brief description:

Agreement ☐ was reached. ☒ was not reached.

Claim(s) discussed: *generally all*

Identification of prior art discussed:
generally that applied

Description of the general nature of what was agreed to if an agreement was reached, or any other comments:
applicant will correct the improper multiple dependecies as set forth in the couresty copy attached to the summary. The applicant may modify the language of the claim either futher defining the optical disk memory as opticallly recordable or may further limit the results of the irradiaton to obviate the 112 rejection. the inherency argument for the jp 02-058744 is based partially upon the testing data which shows much improved protectivity over other carbon films. The applicant argues that there may be a criticality in the 30 pinhole/mm limit and may provide data to support this. none of the references cited specifically disclose the number of pinholes, but clearly point to reducing the number of them. the issue of the ultrasonic vibration may not be as relevant with the instant claims, but might provide a futher basis for distinguishing overthe prior art.

(A fuller description, if necessary, and a copy of the amendments, if available, which the examiner agreed would render the claims allowable must be attached. Also, where no copy of the amendents which would render the claims allowable is available, a summary thereof must be attached.)

1. ☒ It is not necessary for applicant to provide a separate record of the substance of the interview.

Unless the paragraph above has been checked to indicate to the contrary, A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION IS NOT WAIVED AND MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a response to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW.

2. ☐ Since the Examiner's interview summary above (including any attachments) reflects a complete response to each of the objections, rejections and requirements that may be present in the last Office action, and since the claims are now allowable, this completed form is considered to fulfill the response requirements of the last Office action. Applicant is not relieved from providing a separate record of the interview unless box 1 above is also checked.

MARTIN J. ANGEBRANNDT
PRIMARY EXAMINER
ART UNIT 1756

Examiner Note: You must sign and stamp this form unless it is an attachment to a signed Office action.

Pending Claims
Serial No. 09/396,381
Your Reference: US2417/2421/2680D3D2
Our Reference: 0756-2027

1. A method for operating an optical disk memory comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

2. A method according to claim 1 wherein said protective film is formed on the surface of said optical disk without heating.

3. A method according to claim 1 wherein said hard-carbon coating comprises a diamond-like carbon.

4. A method according to claim 1 wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

5. A method according to claim 1 wherein the thickness of said hard-carbon coating is 50Å or more.

6. A method according to claim 1 wherein said hard-carbon coating contains hydrogen.

8. A method for operating an optical disk memory comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

9. A method according to claim 8 wherein said protective film is formed on the surface of said optical disk without heating.

10. A method according to claim 8 wherein said hard-carbon coating comprises a diamond-like carbon.

11. A method according to claim 8 wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

12. A method according to claim 8 wherein the thickness of said hard-carbon coating is 50Å or more.

13. A method according to claim 8 wherein a concentration of said element is 20 atomic% or less.

14. A method according to claim 8 wherein said hard-carbon coating contains hydrogen.

15. A method for operating an optical disk memory comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

16. A method according to claim 15 wherein said protective film is formed on the surface of said substrate without heating.

17. A method according to claim 15 wherein said hard-carbon coating comprises a diamond-like carbon.

18. A method according to claim 15 wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

19. A method according to claim 15 wherein the thickness of said hard-carbon coating is 50Å or more.

20. A method according to claim 15 wherein said hard-carbon coating contains hydrogen.

22. A method for operating an optical disk memory comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said contains at least one of element selected from the group consisting of Si, B, N, P and F.

23. A method according to claim 22 wherein said protective film is formed on the surface of said substrate without heating.

24. A method according to claim 22 wherein said hard-carbon coating comprises a diamond-like carbon.

25. A method according to claim 22 wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

26. A method according to claim 22 wherein the thickness of said hard-carbon coating is 50Å or more.

27. A method according to claim 22 wherein a concentration of said element is 20 atomic% or less.

28. A method according to claim 22 wherein said hard-carbon coating contains hydrogen.

29. A method for operating an optical disk memory comprising the steps of:
introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;
irradiating a laser light having an wavelength of 700 to 800 nm onto said optical disk through said hard-carbon coating ;
wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

30. A method according to claim 29 wherein said protective film is formed on the surface of said optical disk without heating.

31. A method according to claim 29 wherein said hard-carbon coating comprises a diamond-like carbon.

32. A method according to claim 29 wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

33. A method according to claim 29 wherein the thickness of said hard-carbon coating is 50Å or more.

34. A method according to claim 29 wherein said hard-carbon coating contains hydrogen.

36. A method for operating an optical disk memory comprising the steps of:
introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;
irradiating a laser light having an wave length of 700 to 800 nm onto said optical disk through said hard-carbon coating ;
wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;
wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

37. A method according to claim 36 wherein said protective film is formed on the surface of said optical disk without heating.

38. A method according to claim 36 wherein said hard-carbon coating comprises a

diamond-like carbon.

39. A method according to claim 36 wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

40. A method according to claim 36 wherein the thickness of said hard-carbon coating is 50Å or more.

41. A method according to claim 36 wherein a concentration of said element is 20 atomic% or less.

42. A method according to claim 36 wherein said hard-carbon coating contains hydrogen.

43. A method for operating an optical disk memory comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a laser light having an wave length of 700 to 800 nm onto said substrate through said hard-carbon coating ;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

44. A method according to claim 43 wherein said protective film is formed on the surface of said substrate without heating.

45. A method according to claim 43 wherein said hard-carbon coating comprises a diamond-like carbon.

46. A method according to claim 43 wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

47. A method according to claim 43 wherein the thickness of said hard-carbon coating is 50Å or more.

48. A method according to claim 43 wherein said hard-carbon coating contains hydrogen.

50. A method for operating an optical disk memory comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a laser light having an wave length of 700 to 800 nm onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

51. A method according to claim 50 wherein said protective film is formed on the surface of said substrate without heating.

52. A method according to claim 50 wherein said hard-carbon coating comprises a diamond-like carbon.

53. A method according to claim 50 wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

54. A method according to claim 50 wherein the thickness of said hard-carbon coating is 50Å or more.

55. A method according to claim 50 wherein a concentration of said element is 20 atomic% or less.

56. A method according to claim 50 wherein said hard-carbon coating contains hydrogen.

57. A method for operating an optical disk memory comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

58. A method for operating an optical disk memory comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

59. A method for operating an optical disk memory comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

60. A method for operating an optical disk memory comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said hard-carbon coating contains at least one of element selected from the

group consisting of Si, B, N, P and F.

61. A method according to either one of claims 57 or 58, wherein said protective film is formed on the surface of said optical disk without heating.

62. A method according to either one of claims 59 or 60, wherein said protective film is formed on the surface of said substrate without heating.

63. A method according to any one of claims 57 to 60, wherein said hard-carbon coating comprises a diamond-like carbon.

64. A method according to any one of claims 57 to 60, wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

65. A method according to any one of claims 57 to 60, wherein the thickness of said hard-carbon coating is 50Å or more.

66. A method according to any one of claims 57 to 60, wherein said hard-carbon coating contains hydrogen.

67. A method according to either one of claims 58 or 60, wherein a concentration of said element is 20 atomic% or less.

68. A method of operating an optical magnetic disk comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

69. A method of operating an optical magnetic disk comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less,

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

70. A method of operating an optical magnetic disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

71. A method of operating an optical magnetic disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

72. A method according to either one of claims 68 or 69, wherein said protective film is formed on the surface of said optical disk without heating.

73. A method according to either one of claims 70 or 71, wherein said protective film is formed on the surface of said substrate without heating.

74. A method according to any one of claims 68 to 71, wherein said hard-carbon coating comprises a diamond-like carbon.

75. A method according to any one of claims 68 to 71, wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

76. A method according to any one of claims 68 to 71, wherein the thickness of said hard-carbon coating is 50Å or more.

77. A method according to any one of claims 68 to 71, wherein said ~~hard-carbon~~ coating contains hydrogen.

78. A method according to any one of claims 69 or 71, wherein a concentration of said element is 20 atomic% or less.

79. A method of operating an optical magnetic disk comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a laser light having an wave length of 700 to 800 nm onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

80. A method of operating an optical magnetic disk comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a laser light having an wave length of 700 to 800 nm onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less,
wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

81. A method of operating an optical magnetic disk comprising the steps of:
introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;
irradiating a laser light having an wave length of 700 to 800 nm onto said substrate through said hard-carbon coating;
wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

82. A method of operating an optical magnetic disk comprising the steps of:
introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;
irradiating a laser light having an wave length of 700 to 800 nm onto said substrate through said hard-carbon coating;
wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;
wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

83. A method according to either one of claims 79 or 80, wherein said protective film is formed on the surface of said optical disk without heating.

84. A method according to either one of claims 81 or 82, wherein said protective film is formed on the surface of said substrate without heating.

85. A method according to any one of claims 79 to 82, wherein said hard-carbon coating comprises a diamond-like carbon.

86. A method according to any one of claims 79 to 82, wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

87. A method according to any one of claims 79 to 82, wherein the thickness of said hard-carbon coating is 50Å or more.

88. A method according to any one of claims 79 to 82, wherein said hard-carbon coating contains hydrogen.

89. A method according to either one of claims 80 or 82, wherein a concentration of said element is 20 atomic% or less.

90. A method of operating an optical magnetic disk comprising the steps of:
introducing an optical disk having a surface protected by a protective film

comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

91. A method of operating an optical magnetic disk comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less,

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

92. A method of operating an optical magnetic disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

93. A method of operating an optical magnetic disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

94. A method according to either one of claims 90 or 91, wherein said protective film is formed on the surface of said optical disk without heating.

95. A method according to either one of claims 92 or 93, wherein said protective film is formed on the surface of said substrate without heating.

96. A method according to any one of claims 90 to 93, wherein said hard-carbon coating comprises a diamond-like carbon.

97. A method according to any one of claims 90 to 93, wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

98. A method according to any one of claims 90 to 93, wherein the thickness of said hard-carbon coating is 50Å or more.

99. A method according to any one of claims 90 to 93, wherein said hard-carbon coating contains hydrogen.

100. A method according to either one of claims 91 or 93, wherein a concentration of said element is 20 atomic% or less.

101. A method of operating a compact disk comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

102. A method of operating a compact disk comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less,

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

103. A method of operating a compact disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

104. A method of operating a compact disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

105. A method according to either one of claims 101 or 102, wherein said protective film is formed on the surface of said optical disk without heating.

106. A method according to either one of claims 103 or 104, wherein said protective film is formed on the surface of said substrate without heating.

107. A method according to any one of claims 101 to 104, wherein said hard-carbon coating comprises a diamond-like carbon.

108. A method according to any one of claims 101 to 104, wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

109. A method according to any one of claims 101 to 104, wherein the thickness of said hard-carbon coating is 50Å or more.

110. A method according to any one of claims 101 to 104, wherein said hard-carbon coating contains hydrogen.

111. A method according to either one of claims 102 or 104, wherein a concentration of said element is 20 atomic% or less.

112. A method of operating a compact disk comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a laser light having an wave length of 700 to 800 nm onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

113. A method of operating a compact disk comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a laser light having an wave length of 700 to 800 nm onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less,

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

114. A method of operating a compact disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a laser light having an wave length of 700 to 800 nm onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

115. A method of operating a compact disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a laser light having an wave length of 700 to 800 nm onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

116. A method according to either one of claims 112 or 113, wherein said protective film is formed on the surface of said optical disk without heating.

117. A method according to either one of claims 114 or 115, wherein said protective film is formed on the surface of said substrate without heating.

118. A method according to any one of claims 112 to 115, wherein said hard-carbon coating comprises a diamond-like carbon.

119. A method according to any one of claims 112 to 115, wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

120. A method according to any one of claims 112 to 115, wherein the thickness of said hard-carbon coating is 50Å or more.

121. A method according to any one of claims 112 to 115, wherein said hard-carbon coating contains hydrogen.

122. A method according to either one of claims 113 or 115, wherein a concentration of said element is 20 atomic% or less.

123. A method of operating a compact disk comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

124. A method of operating a compact disk comprising the steps of:

introducing an optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less,

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

125. A method of operating a compact disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

126. A method of operating a compact disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

127. A method according to either one of claims 123 or 124, wherein said protective film is formed on the surface of said optical disk without heating.

128. A method according to either one of claims 125 or 126, wherein said protective film is formed on the surface of said substrate without heating.

129. A method according to any one of claims 123 to 126, wherein said hard-carbon coating comprises a diamond-like carbon.

130. A method according to any one of claims 123 to 126, wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

131. A method according to any one of claims 123 to 126, wherein the thickness of said hard-carbon coating is 50Å or more.

132. A method according to any one of claims 123 to 126, wherein said hard-carbon coating contains hydrogen.

133. A method according to either one of claims 124 or 126, wherein a concentration of said element is 20 atomic% or less.

134. A method of operating an optical disk comprising the steps of:

introducing said optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

135. A method of operating an optical disk comprising the steps of:

introducing said optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less,

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

136. A method of operating an optical disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

137. A method of operating an optical disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a semiconductor laser light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

138. A method according to either one of claims 134 or 135, wherein said protective film is formed on the surface of said optical disk without heating.

139. A method according to either one of claims 136 or 137, wherein said protective film is formed on the surface of said substrate without heating.

140. A method according to any one of claims 134 to 137, wherein said hard-carbon coating comprises a diamond-like carbon.

141. A method according to any one of claims 134 to 137, wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

142. A method according to any one of claims 134 to 137, wherein the thickness of said hard-carbon coating is 50Å or more.

143. A method according to any one of claims 134 to 137, wherein said hard-carbon coating contains hydrogen.

144. A method according to either one of claims 135 or 137, wherein a concentration of said element is 20 atomic% or less.

145. A method of operating an optical disk comprising the steps of:

introducing said optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a laser light having an wave length of 700 to 800 nm onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

146. A method of operating an optical disk comprising the steps of:

introducing said optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a laser light having an wave length of 700 to 800 nm onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less,

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

147. A method of operating an optical disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a laser light having an wave length of 700 to 800 nm onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

148. A method of operating an optical disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a laser light having an wave length of 700 to 800 nm onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

149. A method according to either one of claims 145 or 146, wherein said protective film is formed on the surface of said optical disk without heating.

150. A method according to either one of claims 147 or 148, wherein said protective film is formed on the surface of said substrate without heating.

151. A method according to any one of claims 145 to 148, wherein said hard-carbon coating comprises a diamond-like carbon.

152. A method according to any one of claims 145 to 148, wherein film quality of said hard-carbon coating is measured in accordance with Raman spectroscopy.

153. A method according to any one of claims 145 to 148, wherein the thickness of said hard-carbon coating is 50Å or more.

154. A method according to any one of claims 145 to 148, wherein said hard-carbon coating contains hydrogen.

155. A method according to either one of claims 146 or 148, wherein a concentration of said element is 20 atomic% or less.

156. A method of operating an optical disk comprising the steps of:

introducing said optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

157. A method of operating an optical disk comprising the steps of:

introducing said optical disk having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said optical disk through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less,

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

158. A method of operating an optical disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less.

159. A method of operating an optical disk comprising the steps of:

introducing a substrate made of an organic resin or an industrial plastic material, said substrate having a surface protected by a protective film comprising a hard-carbon coating having a thickness of 500Å or less;

irradiating a visible light onto said substrate through said hard-carbon coating;

wherein the number of pin-holes in said hard-carbon coating is $30/mm^2$ or less;

wherein said hard-carbon coating contains at least one of element selected from the group consisting of Si, B, N, P and F.

160. A method according to either one of claims 156 or 157, wherein said protective film is formed on the surface of said optical disk without heating.

161. A method according to either one of claims 158 or 159, wherein said protective film is formed on the surface of said substrate without heating.

162. A method according to any one of claims 156 to 159, wherein said hard-carbon coating comprises a diamond-like carbon.

163. A method according to any one of claims 156 to 159, wherein film quality of

said hard-carbon coating is measured in accordance with Raman spectroscopy.

164. A method according to any one of claims 156 to 159, wherein the thickness of said hard-carbon coating is 50Å or more.

165. A method according to any one of claims 156 to 159, wherein said hard-carbon coating contains hydrogen.

166. A method according to either one claims 157 or 159, wherein a concentration of said element is 20 atomic% or less.

said hard-carbon coating is measured in accordance with Raman spectroscopy.

164. A method according to any one of claims 156 to 159, wherein the thickness of said hard-carbon coating is 50Å or more.

165. A method according to any one of claims 156 to 159, wherein said hard-carbon coating contains hydrogen.

166. A method according to either one claims 157 or 159, wherein a concentration of said element is 20 atomic% or less.